

REMARKS

Claims 1 to 11 remain in this application.

Reconsideration of the rejection of the claims is requested.

Claim 1 has been rejected as being anticipated by Schaeffer with the Examiner alleging that the layer of alumina 18 formed over a bond coat is considered a "crack arresting layer". Issue is taken in this respect.

Schaeffer teaches that the bond coating 14 must be oxidation-resistant and typically forms an alumina layer 18 on the surface of the bond coating when the coated blade [substrate] is exposed to elevated temperatures (see paragraph 0016, lines 8-11). Thus, the layer of alumina 18 is not separate from the bond coating. That is to say, the alumina layer 18 is not separately applied over the bond coating 14 by any process. Instead, the alumina layer 18 is formed by oxidation of the bond coating and is thus part of the bond coating 14.

Further, there is no teaching in Schaeffer that the alumina layer 18 is a crack-arresting layer. The Examiner's allegation is, technically, completely erroneous. Any alumina layer is very brittle and is never considered to be a "crack arresting" layer, certainly not in the context of this coating. For example, the Young's Modulus for alumina is about 390 GPa, whereas that for zirconia is between 160-240 GPa, almost half that of alumina. Thus, it may be inferred that the alumina layer 18 is more brittle than that of the zirconia layer 12.

Still further, the Examiner has not presented any basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic of crack resistance necessarily flows from the teachings of Schaeffer. "In relying upon the theory of inherency, the examiner must provide a basis in fact and/or

technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990).

Schaeffer teaches that the alumina layer 18 serves to protect the underlying substrate 16 from oxidation. There is no teaching in Schaeffer that the cracks in the overlying layer YSZ do not extend into the alumina layer 18 or that the alumina layer 18 prevents cracks from extending into the alumina layer 18.

In view of the above, a rejection of claim 1 as being anticipated by Schaeffer is not warranted pursuant to the provisions of 35 U.S.C. 102.

Claim 1 has also been rejected as being anticipated by Subramanian '137. The Examiner considers the gaps 28 to be "cracks". Issue is taken in this respect.

The gaps 28 of Subramanian '137 have a width of no more than 50 microns and preferably no more than 25 microns (column 5, lines 60 to 62) and have a gap center line spacing of 1000 microns. A vertically cracked top coat of YSZ has cracks that are visible only under a microscope and typically do not have a dimension attached thereto. An analogy is made to a cracked glass or a cracked windshield, i.e. only the length dimension is applied since the "width" is microscopically thin. Accordingly, one skilled in the art would not consider the gaps 28 of Subramanian '137 as cracks.

Of note, the gaps 28 of Subramanian '137 are formed by expending energy, for example by the use of laser energy for engraving the gaps (see column 5, lines 50 to 51). As a result, the modulus of elasticity of the ceramic coating 18 may be the same or higher in the bulk of the coating 18. To the contrary, a vertically cracked coat of YSZ uses up energy and, as a consequence, the modulus of elasticity of the coat is reduced.

Thus, from a materials standpoint, the claimed top coat and the coating 18 of Subramanian '137 have different elastic properties.

In view of the above, a rejection of claim 1 as being anticipated by Subramanian '137 is not warranted pursuant to the provisions of 35 USC 102.

Claim 1 has also been rejected as being anticipated by Subramanian '539. The layer 22 of YSZ has a columnar-grain structure wherein columns of material 24 are separated by a respective plurality of gaps 26. (column 4, lines 22 to 24). The material 24 between the gaps 26 is made of one or more grains, with each grain having a high aspect ratio of height/width in the range of 500-400 or preferably around 200. The number of grains between adjacent gaps 26 may be in the range of 5-300 depending upon the deposition process with each grain having a width of from about 1-3 microns. The width of each gap may be in the range of 1-2 microns.

For reasons expressed above with respect to Subramanian '137, it is respectfully submitted that the gaps 26 of Subramanian '539 cannot be considered cracks.

Subramanian '539 teaches that the layer 20 may have a degree of porosity sufficiently high to arrest the propagation of a crack originating at the generally vertical gaps 26. Thus, Subramanian '539 teaches that the gaps 26 are not cracks. Accordingly, a rejection of claim 1 as being anticipated by Subramanian '539 is not warranted pursuant to the provisions of 35 USC 102.

Of note, despite the well known process of forming a thermal barrier coating with vertical cracks such as described in US Patent 5,073,433 (Taylor), neither Subramanian '137 or Subramanian '539 describes a technique for forming a vertically cracked top coat of YSZ. Instead, each employs a process to obtain gaps in a coating surface. The

coating of YSZ is not classified as a vertically cracked coat. Thus, each of Subramanian '137 and Subramanian '539 distinguishes a "gap" from a "crack".

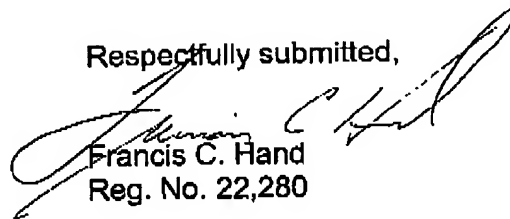
Claims 2 to 6 depend from claim 1 and are believed to be allowable for similar reasons.

Claim 7 contains recitations similar to claim 1 and has been further amended to include the recitations of claim 4.

Claim 9 is directed to a specific coated substrate and contains recitations similar to claims 1 and 6.

The application is believed to be in condition for allowance and such is respectfully requested.

Respectfully submitted,



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